A new biosensor based on nanogold doping in p-HEMA alcohol oxidase detects formaldehyde in fresh food

Abstract

Formaldehyde is a known carcinogen which may cause cancer when accumulated in the body. This study showed the results of a formaldehyde biosensor which was fabricated by nanogold doping in a poly-2-hydroxy ethyl methacrylate (p-HEMA) membrane. The biocatalysts used for the biosensor were 1.0% ferrocene mediator and alcohol oxidase which was then deposited on a carbon screen-printed electrode. 2,2-Dimethoxy-2-phenyl-acetophenone (DMPP) was applied to the membrane as a polymerization agent. The amperometric method was employed with a phosphate buffer solution (pH = 7.2). The optimum potential was selected to be 0.3 V which obtained good linear calibration (R2 = 0.99) for a range of 0.02-0.16 mM formaldehyde (n = 4). The RSD (Relative Standard Deviation) and LOD (Limit of Detection) were found to be 5.62% and 0.007 mM formaldehyde, respectively. The fabricated biosensor successfully detected formaldehyde in selected fresh foodstuffs (tauhu, meatballs, shrimp and dried and wet fish) and the results were well correlated with the NASH standard method.